

WHAT IS CLAIMED IS:

1 1. A method of manufacturing a forged article including a
2 surface, the method comprising:

3 defining a negative tooling pattern based on the surface;

4 providing a tooling set having a bottom die, a top die and an anvil,
5 the bottom die being formed with an upper die surface that conforms to the negative
6 tooling pattern, the anvil extending through the bottom die and defining an axis, the
7 bottom die and the top die cooperating to define a die cavity;

8 preheating an annular blank formed of ferrous material to forging
9 temperature selected T_w release to the melting temperature T_m of the material so
10 that the homologous absolute temperature ratio T_w/T_m is between .62 and .80;

11 placing an annular blank on an anvil and into the die cavity between
12 a top die and the bottom die; and

13 pressing the blank between the top and bottom dies in a pressing
14 direction that is generally parallel to the axis to form the forged article in single
15 stroke.

1 2. The method according to claim 1, wherein homologous
2 temperature ratio is .65 to .70.

1 3. The method according to claim 2, wherein the hollow blank
2 is heated to a temperature of about 1700 degrees Fahrenheit to about 1800 degrees
3 Fahrenheit.

1 4. The method according to claim 1, further comprising selecting
2 a forging temperature so that the material dynamically re-crystallizes to an ASTM
3 grain size of about 7 to about 8 as the blank is being forged.

1 5. The method according to claim 1, further comprising coating
2 the hollow blank with a lubricant prior to forging.

1 6. The method according to claim 1, wherein the forged article
2 is net shaped or near-net shaped.

1 7. The method according to claim 1, further comprising forming
2 the hollow blank such that it conforms to a predetermined volumetric size to thereby
3 control a weight of the forged article.

1 8. The method according to claim 1, further comprising
2 sectioning a tube shaped billet to create the hollow blank.

1 9. The method according to claim 1, further comprising
2 removing an amount of excess material from a second surface of the forged article
3 opposite the surface.

1 10. The method according to claim 1, wherein the hollow blank
2 is ring-shaped.

1 11. A forged article made according to the method of claim 1.

1 12. A method of manufacturing a ring gear including a surface
2 having teeth, the method comprising:

3 defining a negative tooling pattern based on the surface;

4 providing a tooling set having a bottom die, a top die and an anvil,
5 the bottom die being formed with an upper die surface that conforms to the negative
6 tooling pattern, the anvil extending through the bottom die and defining an axis, the
7 bottom die and the top die cooperating to define a die cavity;

8 preheating an annular blank formed of ferrous material to forging
9 temperature selected T_w release to the melting temperature T_m of the material so
10 that the homologous absolute temperature ratio T_w/T_m is between .62 and .80;

11 placing an annular blank on an anvil and into the die cavity between
12 a top die and the bottom die; and

13 pressing the blank between the top and bottom dies in a pressing
14 direction that is generally parallel to the axis to form the ring gear.

1 13. The method according to claim 12, wherein homologous
2 temperature ratio is .65 to .70.

1 14. The method according to claim 13, wherein the hollow blank
2 is heated to a temperature of about 1700 degrees Fahrenheit to about 1800 degrees
3 Fahrenheit.

1 15. The method according to claim 12, further comprising
2 dynamically re-crystallizing a material of the hollow blank to an ASTM grain size
3 of about 7 to about 8 as the hollow blank is being pressed.

1 16. The method according to claim 12, further comprising coating
2 the hollow blank with a lubricant.

1 17. The method according to claim 12, wherein the ring gear is
2 net shaped or near-net shaped.

1 18. The method according to claim 12, further comprising
2 forming the hollow blank such that it conforms to a predetermined volumetric size
3 to thereby control a weight of the ring gear.

1 19. The method according to claim 12, further comprising
2 forming during the forging pressing operation a series of fluid holes.

1 20. A ring gear made according to the method of claim 12.